

	XML Schema1	Int	Float	XML Schema2	String
Row 1	Column 1 XML Instance 1	Column 2 1	Column 3 0.1746	Column 4 XML Instance a	Column 5 “storage”
Row 2	Column 1 XML Instance 2	Column 2 7	Column 3 0.23232	Column 4 XML Instance b	Column 5 “of”
Row 3	Column 1 XML Instance 3	Column 2 3	Column 3 0.14159	Column 4 XML Instance c	Column 5 “strings”

A RELATIONAL DATABASE STORING
XML INSTANCES

FIGURE 1 - Prior Art

<i>namespace URI</i>	201
“http://www.microsoft.com/xquery”	210
“”	220
“foo”	230

SQL XML Schema Collection Identifier DB.RelSch.foo

FIGURE 2

```
CREATE XML SCHEMA COLLECTION <SqlID> AS <expression> [<expression>...]
```

FIGURE 3

402

```
1. CREATE XML SCHEMA COLLECTION mssqlID1 AS
'<schemaman xmlns="http://www.w3.org/2000/10/XMLSchema" targetNamespace="http://
www.w3.org/namespace/"> 401
<element name="TOP">
<complexType>
<attribute name="name" type="string" use="required" />
<attribute name="value" use="default" value="no">
<simpleType>
<restriction base="string">
<enumeration value="yes" />
<enumeration value="no" />
</restriction>
</simpleType>
</attribute>
</complexType>
</element>
</schemaman>' 403
Schema
Components
```

FIGURE 4

501

```
<include
  id = ID
  schemaLocation = anyURI
  {any attributes with non-schema
  namespace . . .}
  Content: (annotation?)
</include>
```

FIGURE 5

```
<redefine
  id = ID
  schemaLocation = anyURI
  {any attributes with non-schema namespace . . .}
  Content: (annotation | (simpleType | complexType | group |
attributeGroup))*
```

FIGURE 6

701

```
<import
  id = ID
  namespace = anyURI
  schemaLocation = anyURI
  {any attributes with non-schema namespace . . .}
  Content: (annotation?)
</import>
```

FIGURE 7

```
1. ALTER XML SCHEMA COLLECTION msSQLID1 ADD '
<element name="BOTTOM">
<complexType>
<attribute name="name" type="string" use="required" />
<attribute name="value" use="default" value="no" />
<simpleType>
<restriction base="string">
<enumeration value="yes" />
<enumeration value="no" />
</restriction>
</simpleType>
</attribute>
</complexType>
</element>
</schema>'
```

FIGURE 8

910
ALTER TABLE <table_name>
ALTER COLUMN <column_name> XML [<SqlID>] [NULL | NOT NULL]
901
920

FIGURE 9

1010
ALTER TABLE products
ALTER COLUMN manufacturing_steps XML (msSQLID1) NOT NULL
1020
1001

FIGURE 10

1110
ALTER TABLE products
ALTER COLUMN manufacturing_steps XML NULL
1101

FIGURE 11

```
1220          1210
  \         /
DROP INDEX xml_index ON products      1230
ALTER TABLE products
ALTER COLUMN manifest (msSqlID2) XML -- this retypes the column
CREATE XML INDEX xml_index ON products (manifest)
  \           1201
```

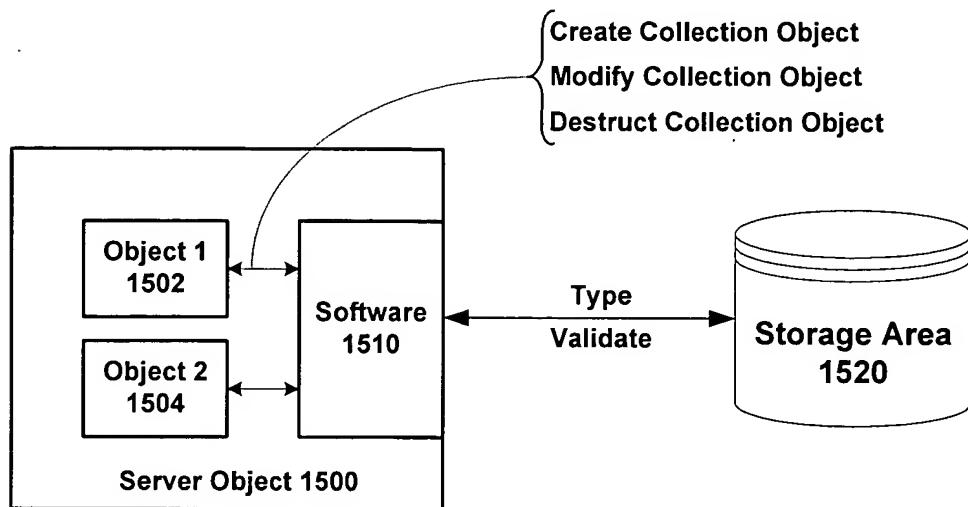
FIGURE 12

1. xml = http://www.w3.org/XML/1998/namespace
2. xs = http://www.w3.org/2001/XMLSchema
3. xsi = http://www.w3.org/2001/XMLSchema-instance
4. fn = http://www.w3.org/2002/11/xquery-functions
5. xdt = http://www.w3.org/2003/02/xquery-datatypes

FIGURE 13

```
sql = urn:schemas-microsoft-com:xml-sql
sqltypes = http://schemas.microsoft.com/sql/2002/types
```

FIGURE 14

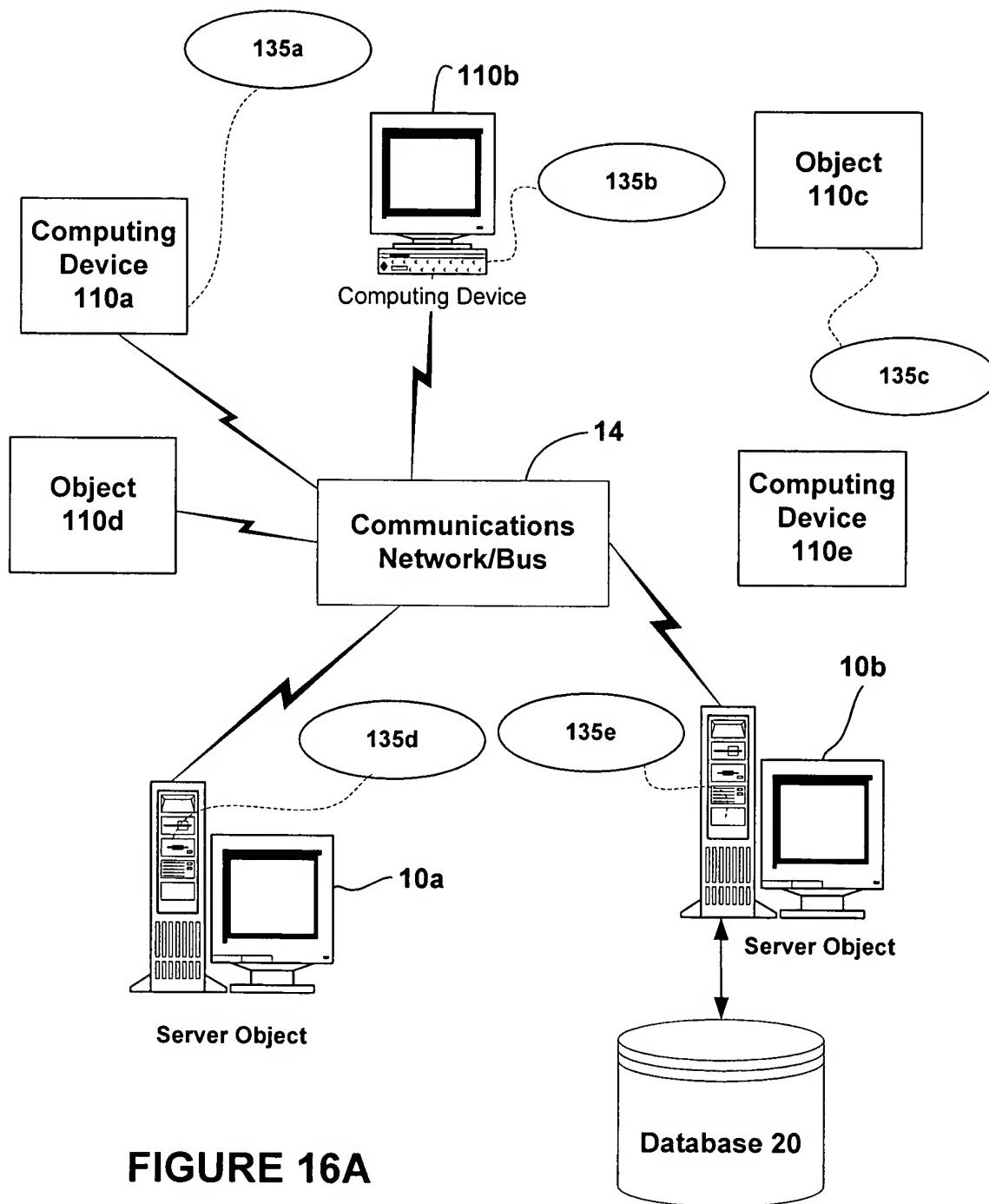
**FIGURE 15A**

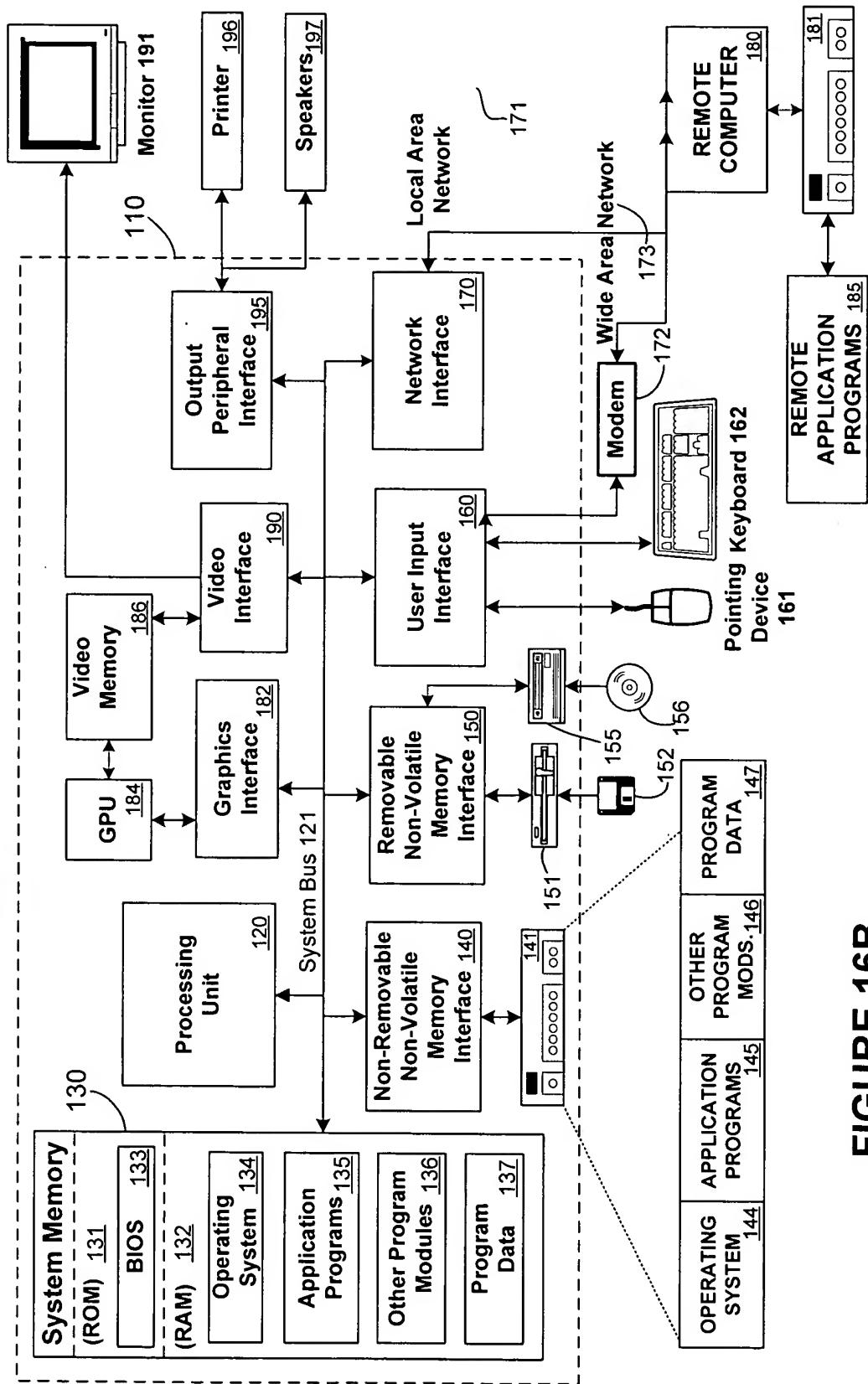
XML Schema Collection Object

	Column 1	Column 2	Column 3	Column 4	Column 5
Row 1	XML Instance 1	1	0.1746	XML Instance a	"storage"
Row 2	XML Instance b	7	0.23232	XML Instance b	"of"
Row 3	XML Instance c	3	0.14159	XML Instance c	"strings"

Int Float XML Schema2 String

FIGURE 15B

**FIGURE 16A**

Computing Environment 100**FIGURE 16B**

Computing Environment 100

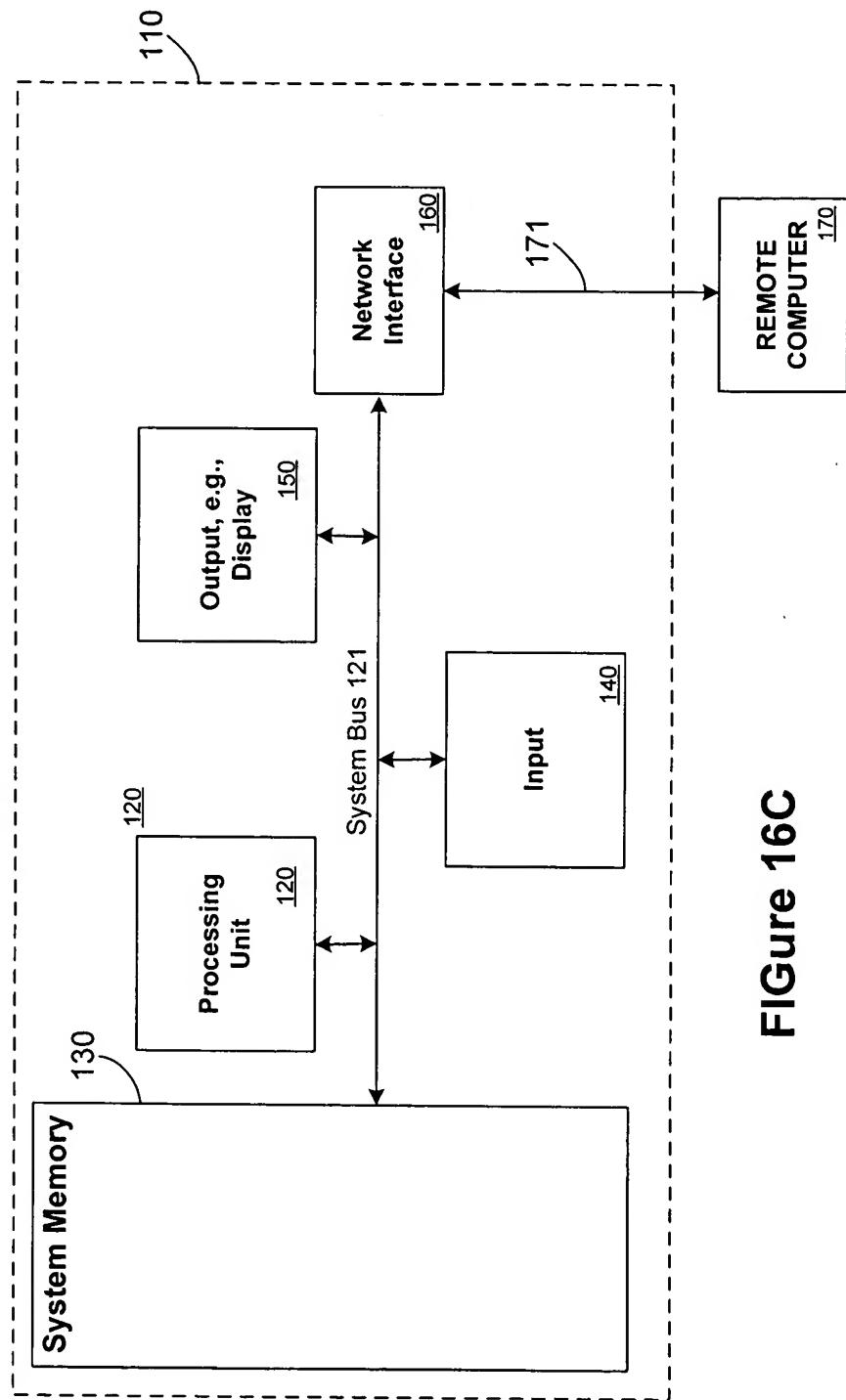


FIGURE 16C